

NOTES ON *LIBERTIA* (IRIDACEAE: SISYRINCHIEAE)
IN SOUTH AMERICA

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ABSTRACT

Comparison of collections of *Libertia colombiana* (Foster 1939) from Colombia, Ecuador, and Peru show that the Bolivian *L. boliviana* (Foster 1946) cannot be upheld as a separate species. We provide an expanded description of *L. colombiana* and establish its range across the Andean paramo as far south as Bolivia, noting the first collections for Ecuador and Peru. We also provide a key to the South American species of *Libertia*, which also occurs in New Guinea, New Zealand, and eastern Australia where there are some six species currently recognized, and possibly three more awaiting description, making a total for the genus of 13 species.

RESUMEN

Mediante comparaciones de ejemplares de *Libertia boliviana* (Foster 1946) y *L. colombiana* (Foster 1939) de Colombia, Ecuador y Perú se propone que *L. boliviana* no puede ser considerada como una especie aparte. Presentamos una descripción ampliada de *L. colombiana* y determinamos su rango de distribución en los páramos andinos hasta el sur de Bolivia, al igual que las primeras colecciones para Ecuador y Perú. Así mismo, incluimos una clave para las especies suramericanas de *Libertia* que también se distribuyen en Nueva Guinea, Nueva Zelanda y el este de Australia, en donde se reconocen cerca de seis especies y posiblemente tres adicionales que están en proceso de descripción para un total de 13 especies para el género.

A member of tribe Sisyrrinchieae of Iridaceae subfamily Iridoideae (Goldblatt 1990), *Libertia* is one of two genera of the family with species in Australasia and South America, the other being *Orthrosanthus* (Goldblatt & Henrich 1987; Goldblatt 1990). *Libertia* is recognized mainly by the outer tepals being smaller than the inner, and often much smaller, and more or less green while the inner tepals are usually white, but blue in *L. sessiflora*. Like other species of Sisyrrinchieae, the filaments are partly united and the style divides at the top of the filament column into three slender, diverging branches. A relatively unspecialized member of the tribe, *Libertia* appears to have no other synapomorphies except for a unique basic chromosome number, $x = 19$ (Goldblatt & Takei 1997).

Australasian species include *L. paniculata* (R. Brown) Sprengel and *L. pulchella* (R. Brown) Sprengel, in Australia and New Guinea and four currently recognized in New Zealand, *L. grandiflora* (R. Brown) Sweet, *L. ixioides* (Foster

f.) Sprengel, *L. micrantha* A. Cunningham, *L. peregrinans* Cockayne et Allan. Three more were recognized for New Zealand by Blanchon (1998) in an unpublished Ph. D. thesis, *L. cranwelliae*, *L. edgariae* and *L. mooreae*. Of the 14 species of *Libertia* described from South America (Index Kewensis), only five are generally recognized, three in Chile (Skottsberg 1928, 1953; Munoz 1966; Rodríguez & Marticorena 2000), and one each for Bolivia and Colombia (Foster 1939, 1945).

New collections made in the Colombian paramo (Celis 2000) show that *Libertia* is represented there by one relatively uniform species, *L. colombiana* R.C. Foster that was described in 1939. The first collections of *Libertia* from Ecuador and Peru, made in 1998 and 1975 respectively, fall within the range of variation for *L. colombiana*. The presence of *L. colombiana* in Ecuador had not been established when Jorgensen and León-Yáñez (1999) published their checklist of the flora of Ecuador and *Libertia* was not included in a checklist of the flora of Peru (Brako & Zarucchi 1993).

A second species, *Libertia boliviana*, was distinguished from *L. colombiana* (and from the closely related Chilean *L. tricocca* Philippi) by its smaller and fewer flowers and in having the filaments free to the base (rather than partly united) (Foster 1946). New collections from Bolivia show that Foster's distinction was incorrect. The filaments are united in the proximal half in the type (Buchtien 701, GH), and in two additional collections (Table 1). Moreover, there is no significant difference in the size and number of the flowers per inflorescence unit in specimens from Bolivia and those from Colombia and Ecuador. In fact, we can find no character separating *L. colombiana* from Bolivian collections of *Libertia* (Table 1). We thus unite *L. colombiana* and *L. boliviana*. The poor documentation of *L. colombiana* from Bolivia (three collections), Ecuador (one collection), and Peru (one collection) may indicate its rarity in these countries or may be due to its inconspicuous flowers. Until recently, there was also a paucity of records from Colombia, now remedied by specialist collecting there.

The immediate relationships of *Libertia colombiana* are evidently with the Chilean *L. tricocca* which is broadly similar in general appearance, modest stature, and flowers with long pedicels. *Libertia tricocca* is readily distinguished by its narrower leaves, mostly 2–3 mm wide, of firm texture with thickened midribs and margins, its normally a smaller stature, seldom exceeding 20 cm, and short rhizome to 2 cm long. Flowers of *L. tricocca* also have shorter inner tepals, ca. 4.5 mm long, and the filaments united for ca. one fourth their length (versus inner tepals 6.5–7 mm long and filaments united for about half their length in *L. colombiana*).

The remaining species of South American *Libertia* are the robust, large-flowered plant known as *L. chilensis* (Molina) Gunckel (also known by the later name *L. formosa* Graham) and the remarkable *L. sessiliflora* (Poepp.) Skottsberg (syn. *L. caerulescens* Kunth & Bouche). This last species has blue flowers borne

TABLE 1. Comparison of quantitative characteristics of *Libertia colombiana* and *L. boliviana*.

Character	<i>L. colombiana</i>	<i>L. boliviana</i>
Height	20–40 cm	30–39 cm
Rhizome length	(2)5–18 cm	7.5–9 cm
Cauline leaves	6.5–28 cm × 3–6 mm	10–26.5 cm × 4–5 mm
Flowering stem length	17–34 cm	10–15 cm
Cauline leaves	2.7–11 cm × 1–3 mm	6 cm × 2 mm
Peduncles (of rhipidia)	2–4.5 cm × 1 mm	2–4.5 cm × 1 mm
Rhipidial spathe length	Outer 9–13 mm Inner 6–10 mm	Outer 7–9 mm Inner 6–7 mm
Pedicle length	(0.3–)1.2–2 cm	0.7–2.5 cm
Flowers per rhipidium	2–3(–4)	2–3
Color flowers	white	white
Outer tepal length	4 mm	3.8–4 mm
Inner tepal length	7 mm	6.5 mm
Filament length	1.8–2 mm, united in lower half	2 mm, united in lower half
Anthers	1.1–1.3 mm, subasifixed	1 mm, subasifixed
Ovary	1–2.5 × 1.5–2.8 mm	2.3 × 2.2 mm
Style	0.8 mm	1 mm
Style branch length	2 mm	2 mm
Capsule	4 × 4–4.5 mm	4 × 5 mm
Seed length	1 mm	1 mm

in sessile rhipidia (the cymose inflorescence units of many Iridaceae) on a straight, unbranched flowering stem.

We include an emended description of *Libertia colombiana* below, a key to the South American species, and outline the complex synonymy of the South American species following Rodríguez and Marticorena (2000).

Libertia colombiana R.C. Foster, Contr. Gray Herb. 127:44. 1938. (Fig. 1). TYPE: COLOMBIA: Risaralda ("Caldas"), río San Rafael, abajo del Cerro Tatamá, 2600–2800 m, 7 Sep 1922. Pennell 10357 (HOLOTYPE: GHI; ISOTYPE: NY!).

Libertia boliviana R.C. Foster, Contr. Gray Herb. 161:4. 1946, syn. nov. TYPE: BOLIVIA: La Paz, Región Andina, 3200 m, Nov 1910. O. Buchtien 701 (HOLOTYPE: GHI).

Evergreen, often tufted herb 20–40 cm high, with a creeping rhizome up to 18 cm long. *Leaves* 6.5–28 cm × 3–6 mm, in two ranks, sword-shaped, apex attenuate, the margins ciliate, sometimes conspicuously so toward the apex. *Flowering stem* 10–34 cm long, subterete, usually branched, bearing cauline leaves progressively smaller above, 2.7–11 cm long. *Inflorescences* rhipidia, terminal on the main and secondary branches, or sessile in axils of branches 2–4.5 cm long, 2–4-flowered; spathes subequal, the outer 7–13 × 0.4–2 mm, slightly longer than the inner (5–10 × 0.4 mm), lanceolate, apex slightly curvate, with marginal cilia conspicuous toward the apex. *Flowers* on pedicels mostly 12–25 mm

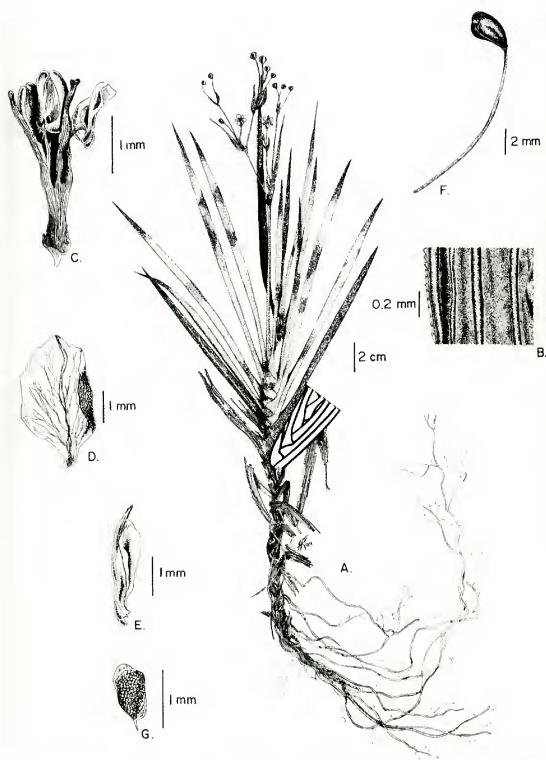


FIG. 1. *Libertia colombiana* R.C. Foster. A. Habit. B. Detail of leaf. C. Stamens and style branches. D. Inner tepal. E. Side view of outer tepal. F. Capsule. G. Seed. (*Idrobo 3991*).

long, well exerted from the spathes, subtended by a bract 1–6 mm long, white; *tepals* unequal, the outer whorl smaller than the inner, basally connate for 0.3–0.5 mm, the outer 3.8–4 × 2.2 mm, elliptical-oblong, obtuse, cucullate, venation acrodromous-parallelodromous, with 5 veins conspicuous, the inner 6.5–7 × 3–3.2 mm, spatulate-ovate, obtuse, venation dendroid. *Filaments* 1.8–2 mm long, partially united in the lower half for 0.8–1 mm; *anthers* subsessile, 1–1.3 mm long. *Ovary* 1–2.5 mm long × 1.5–2.8 mm diameter, spheroidal to ellipsoid; *style* dividing just beyond the top of the filament column into three branches, each 2 mm long, terminally stigmatic. *Capsules* 3–4 × 4–5 mm, subglobose, borne on pedicels 1.5–3 cm long; *seeds* ca. 36 in each capsule, 1 mm long, rounded, surface rugose, reddish brown.

Distribution.—Andean southern America mainly in paramo, 2200–3900 m, fairly common in Colombia in the Vertiente Caucaña, Vertiente Magdalenense, and Vertiente Occidental, and evidently local and rare in Ecuador, Peru, and Bolivia.

Additional specimens examined: **BOLIVIA**. **La Paz**: provincia Nor Yungas, 4.7 km al NE (abajo) de Chuspipata, 16°17'S - 67°47'W, 2800 m, 11 Nov 1987, *Solomon*, J. 17343 (MO); provincia Sud Yungas, 1.3 km al oeste de Unduavi, 16°18'S - 67°55'W, 3400 m, 12 Nov 1987, *Solomon*, J. 17418 (MO). **COLOMBIA**. **Antioquia**: Abriaquí, Parque Nacional Natural Las Orquídeas, 6°37'2 N - 76°18.2 W, 29 Abr 1990, *Ramírez*, J. 3844 (MEDEL); Andes, vereda La Siria, 6°37.2 N - 76°18.2 W, 2200 m, 03 Mar 1995, *Sánchez*, D. 4160 (MEDEL). **Cauca**: Páez, Cordillera central, cabeceras del río Palo, quebrada del río López y quebrada del Duende, 2°57.3'N - 76°9.45'W, 3400–3450 m, 03 Dic 1944, *Cuatrecasas* 18944 (GH, VALLE); Inza, alrededores de la Laguna de Cusiyo, 2°33'N - 76°12'W, 3017 m, 07 Oct 1951, *Idrobo* 3991 (COL). **Quindío**: Génova, Camino finca Servia-Valle Chiquito, 4°13'N - 75°48'W, 2700–3900 m, 16 Jul 1990, *Vélez*, M. 2086 (HUQ); Génova, Vereda alto San Juan, finca La Caucasia, páramo, 4°13'N - 75°48'W, 3200–3500 m, 15 Dic 1995, *Vélez*, M. 6534 (HUQ). **Risaralda**: Santuario, Cerro Tatamá, 5°2.6'N - 76°3.4'W, 3200–3400 m, 08 Sep 1922, *Pennell* 10474 (GH); Santuario, Vereda Las Colonias, 400 m arriba del campamento, 5°2.6'N - 76°3.4'W, 2910 m, 02 Feb 1983, *Torres* 1495 (COL). **Tolima**: Ibagué, Parque Nacional Natural los Nevados, parte alta del río Toche, principalmente en la margen derecha del río, 4°36'N - 75°23'W, 3200 m, 29 Jun 1985, *Barbosa*, C. 3556 (FMB); Ibagué, corregimiento de Juntas, faldas del Nevado del Tolima, del Rancho hacia la Cueva, 4°36'N - 75°23'W, 2900–3100 m, 08 Ago 1975, *Jaramillo* 5122 (COL). **Valle**: Jamundí, Los Farallones de Cali, cerca a las cuevas de los Osos, 3°9.3'N - 76°50'W, 3600 m, 26 Ago 1991, *Calderón* 44A (COL). **ECUADOR**. **Tungurahua**: Banos Cantón, Parque Nacional Llanganates, faldas del Cerro Negro, valle de Los Frailejones, 01°10'S-78°15'W, 3500 m, 11 Oct 1998, *Vargas H. et al.* 2738 (MO). **PERU**. **Cuzco**: near Machu Picchu, along old Inca path to Cuzco, Dec 1975, *Rafinski* s.n. (K).

REVISED KEY TO LIBERTIA IN SOUTH AMERICA

1. Flowers pale blue, sessile or with short pedicels less than 3 mm long; ovary ca. 4 mm long; capsules ellipsoid, 7–10 × 5–6 mm _____ **L. sessiliflora**
1. Flowers white, outer tepals green at least outside, pedicels (7–)10–25 mm long; ovary 1–2.5 mm long; capsules subglobose, 2–4 × 2–5 mm.
 2. Stem more or less straight, with rhipidia sessile except the terminal; flowers 4–10 per rhipidium; inner tepals 10 × 6.5 mm; filaments 6 mm long, anthers 2.5 mm long; style branches 5 mm long _____ **L. chilensis**
 2. Stem flexuose, rhipidia pedicellate except in axils of branches; flowers 2–4 per

rhypidium; inner tepals 4.5–7 × ca. 3 mm; filaments 1.8–2.5 mm long, anthers 1–1.3 mm long; style branches 2(–3) mm long.

3. Plants less than 20 cm high; creeping rhizome up to 2 cm long; leaves 1–3 mm wide, firm-textured with thickened midribs and margins; inner tepals 4.5 mm long; filaments united for ca. one fourth their length; capsules 2 × 3 mm

L. tricoeca

3. Plants 20–40 cm high, creeping rhizome (2–)5–18 cm long; leaves 3–6 mm wide, without thickened midribs and margins; inner tepals 6.5–7 mm long; filaments united for ca. half their length; capsules 4 × 4–5 mm

L. colombiana

SYNONYMY OF THE SOUTH AMERICAN SPECIES
(EXCLUDING *LIBERTIA COLOMBIANA*)

- 1. *Libertia chilensis*** (Molina) Gunckel, Rev. Chil. Hist. Nat. 31:87. 1927. *Strimaria chilensis* Molina, Sagg. Stor. Nat. Chili ed. 2:130. 1810. TYPE: unknown—the identity of the basionym is convincingly demonstrated by Gunckel (1927) to be the plant better known as *L. formosa* R. Grah. based on an analysis of the protologue.

Libertia formosa R. Grah., Edinb. N. Phil. J. 1833.383. Oct. 1833. TYPE: CHILE [as Chili, Cape Horn] imported by J. Anderson and cultivated first at the Clapton Nursery, London, and then in Edinburgh, Scotland, no preserved specimen known. Illustrations published in Edwards's Botanical Register (Lindley 1833) and in Curtis's Botanical Magazine (Graham 1834) serve to identify the species and may be regarded as type material as they were grown from the same stock originally collected in Chile and cultivated in London and then in Edinburgh. According to Lindley (1833) the plants were collected by J. Anderson on the coast of Chiloé Island. We designate the illustration in Curtis's Botanical Magazine as lectotype.

Libertia crassa R. Grah., Edinb. N. Phil. J. 1833.383. Oct. 1833. TYPE: CHILE [as Chili, Cape Horn] imported by J. Anderson and cultivated first at the Clapton Nursery, London, and then in Edinburgh, Scotland, known only from the description.

Libertia elegans Poepp., Fragm. Syn. Pl. Chil. 3. 1833. *Roterbe elegans* (Poepp.) Steud. in Lechler, Pl. Chil. Exsicc. no. 569, comb. inval. non publ. TYPE: CHILE: near Valdivia, without date, Lechler s.n. (ISOTYPE: K).

Libertiagrandidiflora Phil., Bot. Zeit. 14:648. 1856, nom. illeg. non *L. grandiflora* (R. Br.) Sweet, Hort. Brit. 1:498. 1826. TYPE: CHILE: Juan Fernandez, collector and date not known (ISOTYPE: SGO).

Notes.—We prefer not to designate lectotypes for *Libertia elegans* and *L. grandiflora* because there may be additional material unknown to us.

Libertia chilensis Klotzsch mss was included by Baker (1877) in the synonymy of *L. elegans* Poepp. and is not a valid name. It therefore does not invalidate the combination *L. chilensis* (Molina) Gunckel. The plant referred to in the literature as *Libertia ixiooides* C. Gay (Fl. Chil. 6:31. 1854) is incorrectly attributed to that author. Gay merely called a Chilean plant by this name, citing Forster fil. and Sprengel as authors of the basionym and combination in *Libertia* respectively, i.e., *L. ixiooides* (Forster f.) Spreng., which is a New Zealand species. Likewise, the plant called *Libertia ixiooides* Klatt [in Mart. Fl. Bras. 2:530, pl. 68, fig. 2. 1871] was not intended as a new species and *L. ixiooides* Spreng. was cited in the text as the source of the name. This is the same New Zealand species, and was presumably cultivated in Brazil where there are no native species of *Libertia*.

Libertia macrocarpa Klatt, *Linnaea* 31:384 (1861–1862) is sometimes cited as a synonym of *L. chilensis* and a possible type has been located at K. This sheet is annotated “Chile, Valparaiso, cultivated at Hort. Gl.” and the collector is not recorded. The specimen is a New Zealand species of *Libertia*, perhaps *L. ixioides*, which it matches in the obovoid capsules.

2. ***Libertia sessiliflora*** (Poepp.) Skottsbo., *Nat. Hist. Juan Fernández & Easter Island* 2:778. 1928. *Sisyrinchium sessiliflorum* Poepp., *Notiz. Geb. Natur.-Heilk.* (ed. L. F. Froriep) 23:277. 1829; et *Fragm. Syn. Pl.* 2. 1833. *Tekel sessiliflora* (Poepp.) Kuntze, *Revis. Gen. Pl.* 2:703. 1891. TYPE: CHILE: without precise locality, Sep, *Poeppig* 283 (HOLOTYPE: B, not seen but extant; MO, photo).

Sisyrinchium sessiliflorum Hook. & Arn., *Bot. Beechey Voy.* 1:47. 1830, nom. illeg. non *S. sessiliflorum* Poepp. 1829. TYPE: CHILE: Concepcion, *Beechey s.n.* (probable HOLOTYPE: K!).

Libertia caeruleascens Kunth & Bouché, *Linnaea* 19:382. 1847. TYPE: CHILE: Valparaiso, Lagunilla, cultivated in Berlin, May 1845, without collector (HOLOTYPE: B, not seen but extant; MO, photo).

Note.—It is not clear whether the name *Sisyrinchium sessiliflorum* J.D. Hook. & Arn., *Bot. Beechey Voy.* 1:47. 1830 (listed as valid, for example, in *Index Kewensis*) was intended as a new species or merely the use of Poeppig’s epithet, published a year earlier but not cited. While it seems prudent to assume the latter, thus simplifying the nomenclature of this species, the Code of Botanical Nomenclature requires citation of an author or the name must be treated as a new species.

3. ***Libertia triccoca*** Phil., *Linnaea* 29:63. 1857–1858. TYPE: CHILE: Valdivia, without date, *Philippi* 944 (SYNTYPES: B, K!, SGO, not seen; MO, photos!), near Tomé (environs of Concepcion at K), without date, *Germain s.n.* (possible SYNTYPES: K!, SGO, not seen; MO, photo).

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